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The United States of America



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Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this

United States Patent

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Attest



US006332280B2

(12) **United States Patent**
Kato et al.

(10) **Patent No.:** **US 6,332,280 B2**
(45) **Date of Patent:** **Dec. 25, 2001**

(54) **VACUUM PROCESSING APPARATUS**

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(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) **Appl. No.:** 09/767,834

(22) **Filed:** Jan. 24, 2001

Related U.S. Application Data

(62) Division of application No. 09/461,432, filed on Dec. 16, 1999, which is a continuation of application No. 09/177,495, filed on Oct. 23, 1998, now Pat. No. 6,012,235, which is a continuation of application No. 09/061,062, filed on Apr. 16, 1998, now Pat. No. 5,950,330, which is a continuation of application No. 08/882,731, filed on Jun. 26, 1997, now Pat. No. 5,784,799, which is a division of application No. 08/593,870, filed on Jan. 30, 1996, now Pat. No. 5,661,913, which is a continuation of application No. 08/443,039, filed on May 17, 1995, now Pat. No. 5,553,396, which is a division of application No. 08/302,443, filed on Sep. 9, 1994, now Pat. No. 5,457,896, which is a continuation of application No. 08/096,256, filed on Jul. 26, 1993, now Pat. No. 5,349,762, which is a continuation of application No. 07/751,952, filed on Aug. 29, 1991, now Pat. No. 5,314,509.

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156/345

(58) **Field of Search** 34/207, 217, 222,
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156/345, 345 C, 345 PC; 118/723 F, 723 I,
730, 719

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(57)

ABSTRACT

This invention relates to a vacuum processing apparatus having vacuum processing chambers the insides of which must be dry cleaned, and to a method of operating such an apparatus. When the vacuum processing chambers are dry-cleaned, dummy substrates are transferred into the vacuum processing chamber by substrates conveyor means from dummy substrate storage means which is disposed in the air atmosphere together with storage means for storing substrates to be processed, and the inside of the vacuum processing chamber is dry-cleaned by generating a plasma. The dummy substrate is returned to the dummy substrate storage means after dry cleaning is completed. Accordingly, any specific mechanism for only the cleaning purpose is not necessary and the construction of the apparatus can be made simple. Furthermore, the dummy substrates used for dry cleaning and the substrates to be processed do not coexist, contamination of the substrates to be processed due to dust and remaining gas can be prevented and the production yield can be high.

13 Claims, 1 Drawing Sheet

